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Concrete Jackets Protect Timber Piles Exposed to Sea Water

South Carolina Highway Department Practice Extends Life of Timber Bridges Along Seacoast—Working Procedure and Tabulation of Cost Data

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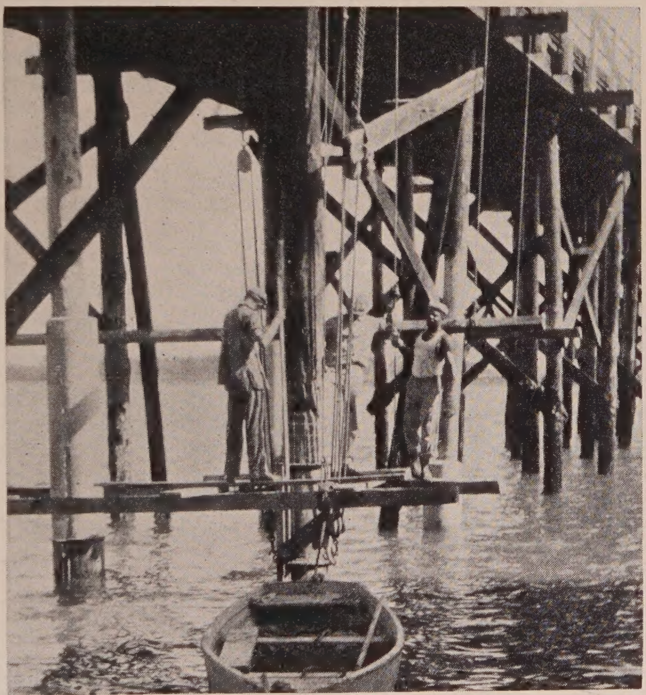

Figure 1. Placing reinforced concrete incasement around wooden piles exposed to sea water

THE South Carolina state highway department has developed an effective practice in placing reinforced concrete protecting jackets around timber piles in existing highway structures exposed to sea water. The ravages of the teredo and limnoria to timber piles in salt and brackish waters along the coast have made replacements and repairs necessary. Even creosoted piles are attacked by the limnoria at a fairly early age. Concrete protecting jackets seem to offer one of the most effective means of checking the depredations of these marine pests.

Figure 2 shows the sliding metal forms used in this work. The metal form sections, as shown in the drawing, are fabricated in halves, and are clamped together by a device which permits their later release and recovery for re-use.

The Working Procedure

The method of procedure followed in the encasement of the piles is to place the form around the pile above water, set the reinforcement in this form and fill with concrete and puddle it in place. Then the whole form, reinforcement and concrete, are slid down the pile the length of the form. Another section of form is placed on top, and reinforcement and concrete are placed in this, which is again slid down the pile. In this manner all the concrete is placed in the dry. After the job is completed and the concrete has had a day or two to harden, a pull on the link loosens the form, which falls apart and is taken off and re-used. The nose, of course, is lost. This is made of light sheet metal, one for each pile treated.

It is generally possible to lower the concrete incasement approximately 3 ft. into the mud. A special hoe was developed to cut the mud from around the pile under water.

The concrete mix commonly used consists of a 1:1½:3 mixture of cement, sand and gravel, the coarse aggregate having a maximum size of ¾ in. The reinforcement used is a 6 by 6-in. mesh made of galvanized No. 8 gauge wire. The thickness of the concrete shell averages about 4 in.

Between high and low tide, where braces or other framing in contact with a pile makes incasement difficult, the practice followed is to cover that part of the pile with 16-oz. copper sheets, nailed on with copper nails. This method is economical, but applicable only above low water, except in cases where new piles are necessary.

Tables 1 and 2 contain detailed cost data on two recent projects, namely, the Ladies Island bridge, in Beaufort County, and the Shem Creek bridge, in Charleston County.

It is understood that pile protection of a similar kind

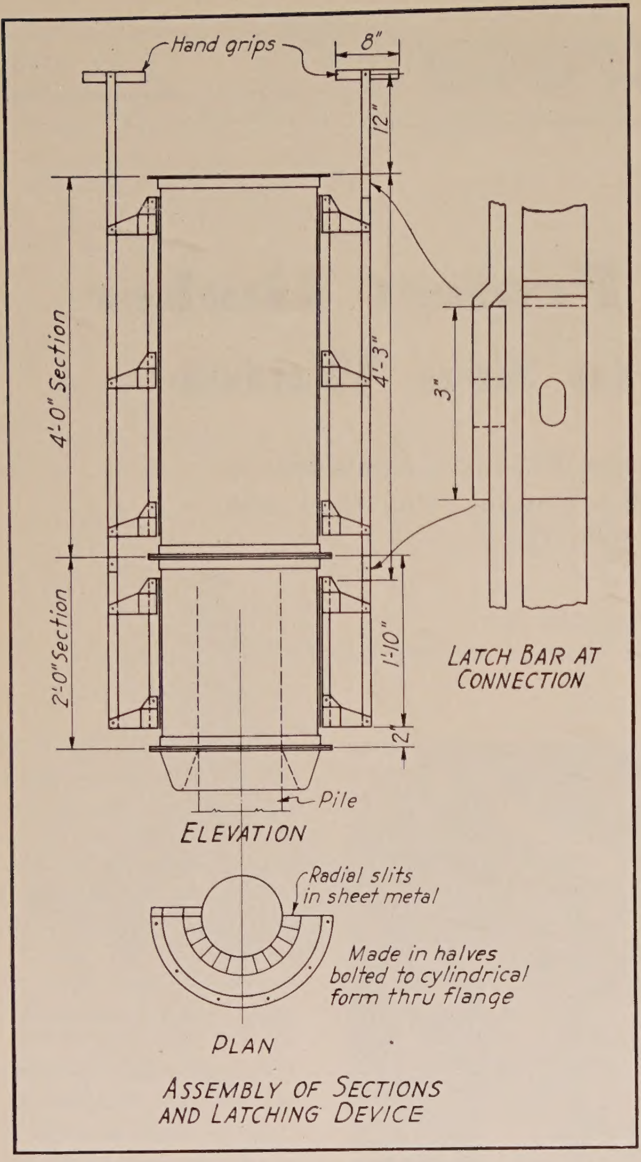
Hand grips
8"
12"
4'-0" Section
4'-3"
3"
2'-0" Section
1'-0"
2"
LATCH BAR AT CONNECTION
Pile
ELEVATION
Radial slits in sheet metal
Made in halves bolted to cylindrical form thru flange
PLAN
ASSEMBLY OF SECTIONS AND LATCHING DEVICE

Figure 2. Details of sections of metal forms

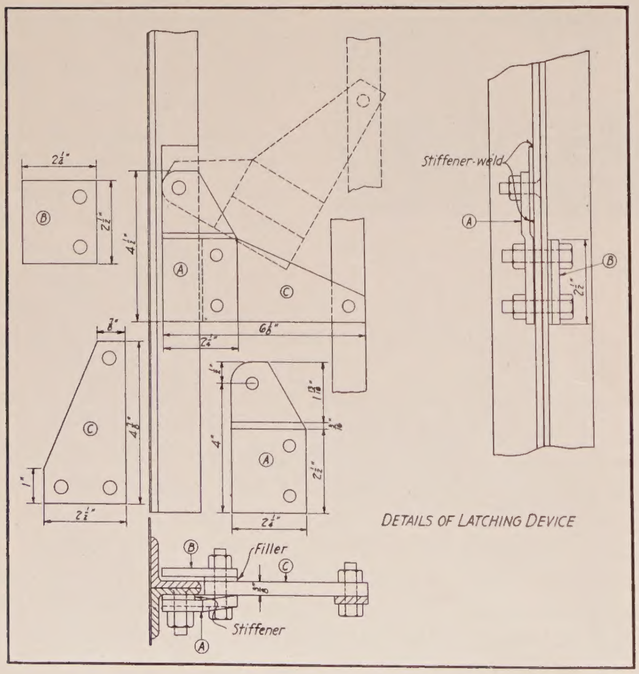

Figure 3. Details of device for releasing forms

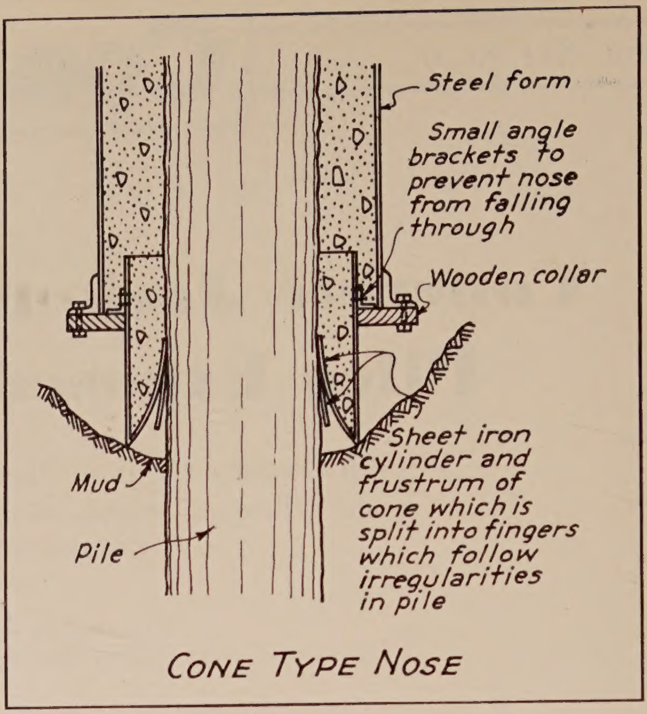
Steel form
Small angle brackets to prevent nose from falling through
Wooden collar
Sheet iron cylinder and frustrum of cone which is split into fingers which follow irregularities in pile
Mud
Pile
CONE TYPE NOSE

Figure 4. Detail of cone type of nose

TABLE 1. COST OF CONCRETE AND COPPER PROTECTION OF PILES. LADIES ISLAND BRIDGE, IN BEAUFORT COUNTY

4,412 lb. sheet copper		$ 669.13
5 kegs copper nails		72.16
1,800 sq. ft. reinforcing		302.36
70 cu. yd. sand		100.03
141 cu. yd. gravel		141.08
212 bbl. cement		482.56
Steel forms		553.30
Supplies from Camp Jackson		92.76
Gas and oil from maintenance shop		47.98
Miscellaneous bills		95.12
Testing cement		5.10
Rent on mixer		50.00
Rent on truck (1,650 miles @ .05)		82.50
Supt. and labor		3,400.46
		$6,094.54
Credits: Forms	$150.00	
Copper nails	57.00	
Cement sacks	81.50	
	$288.50	
		288.50
		$5,806.04

3,267 ft. of piling protected. Average cost per lin. ft. $1.78.

TABLE 2. DETAILED COST OF CONCRETE PROTECTION FOR PILES. ROUTE NO. 40, JANUARY, 1933. SHEM CREEK BRIDGE, IN CHARLESTON COUNTY

101 bbl. cement	$ 261.95
64 tons of stone and gravel	146.33
46 tons of sand	68.82
Reinforcing wire for concrete	138.36
Steel forms $100.00. Sheet iron and making special forms $75.05	175.05
Gas and oil from maintenance department	41.91
Miscellaneous bills	19.25
Scraping and painting forms	32.29
Taking down and rebuilding fenders	75.53
Rent on concrete mixer	20.00
Rent on pick-up, 656 miles at 1 cent per mile	6.56
Supt. and labor	1,253.73
	$2,239.78

1,067 ft. of piling protected. Average cost per lin. ft., $2.10. Painting beam span $11.00.

has been placed on about 3,000 piles in the federal government dock at Charleston. The method of procedure was similar to that on the state highway department work, except that a lighter sheet steel form was used and was left in place. The work on the state highway bridges was placed under the supervision of the writer, acting under the direction of Charles H. Moorefield, state highway engineer.

Huge Public Works Program Covers Wide Variety of Projects

Total Is $3,300,000,000—Highway Funds of 400 Million Need Not Be Matched by States—Should Do Preliminary Work Now

THE $3,300,000,000 public works construction program included in the proposed National Industrial Recovery Act, introduced in Congress on May 17, will at last inaugurate the positive action for which the leaders of the construction industry have been fighting.

With the national administration wholeheartedly back of this program, and with the President urging prompt action on the legislation, it is expected that little time will be lost in getting this momentous measure adopted.

Preliminary Work Can Be Started Now

While some changes may be made in the proposed bill, it is not expected that these will be of major importance. In consequence, it is well for the construction industry to become familiar with the character of construction projects coming within the scope of the measure, so that prompt action may be taken. Much, in fact, can be done in advance, by way of bringing worthy projects to the front; and in many cases local and state officials can, if they will, make surveys and prepare plans even before the act is passed.

Character of Work Included

The public works and other construction projects proposed under this measure are set forth in Section 202 of Title II of the act. Projects to be authorized include:

(a) Construction, repair and improvement of public highways and parkways, public buildings and any publicly owned facilities.

(b) Conservation and development of natural resources, including control, utilization and purification of waters, prevention of soil erosion, development of water power, transmission of electrical energy, and construction of river and harbor improvements.

(c) Any projects of the character heretofore constructed or carried on either directly by public authority or with public aid to serve the interests of the general public.

(d) Construction, under public regulation or control, of low-cost housing and slum-clearance projects.

(e) Any project (other than those included in the foregoing classes) of a character heretofore eligible for loans under subsection (a) of Section 201 of the emergency relief and construction act of 1932, as amended. [This refers to so-called self-liquidating projects eligible for loans from the Reconstruction Finance Corporation under the Federal Relief Act of 1932.—Editor].

States Need Not Match Highway Funds

Subsection (a) of Section 204 authorizes grants to states for highway construction, in an aggregate amount not exceeding $400,000,000, for the following purposes and under the following conditions:

(1) For emergency construction on the federal-aid highway system and extensions thereof, into and through municipalities.

The amount apportioned to any one state under this subsection may be used to pay all or any part of the cost of highway construction, including the elimination of hazards to highway traffic, such as the separation of grades at crossings, the reconstruction of existing railroad grade crossing structures, the relocation of highways to eliminate railroad crossings, the widening of narrow bridges and roadways, the building of footpaths, the replacement of unsafe bridges, the construction of routes to avoid congested areas, the construction of facilities to improve accessibility and the free flow of traffic, and any other construction that will provide safer traffic facilities or definitely eliminate existing hazards to pedestrian and vehicular traffic.

In carrying out the improvements to eliminate traffic hazards in connection with railroad crossings at grade, the state highway department shall constitute an agency for the federal government. No funds made available under Title II (the public works part of the National Industrial Recovery Act) shall be used for the acquisition of any land, right-of-way or easement in connection with any railroad grade-elimination project.

(2) For emergency construction of secondary or feeder roads included in a system to be agreed upon by the state highway department and the Secretary of Agriculture, provided that the state or responsible political subdivision shall provide for the proper maintenance of such roads. Such grants shall be available for payment of the full cost of the surveys, plans, improvement and construction of secondary or feeder roads.

Amounts allocated for highway construction, either under paragraphs (1) or (2) above, shall be apportioned among the several states, three-fourths in accordance with the provisions of Section 21 of the Federal Highway Act of November 9, 1921, as amended, and one-fourth on a population basis.

Funds shall be available on July 1, 1933, and shall remain available until expended; but no part of the funds apportioned to any state need be matched by the state.

Minimum wage rates must be determined in advance and stated in the call for bids, and no persons (other than those in executive, administrative or supervisory positions) shall be permitted to work more than 30 hours per week.

It will thus be seen that highway departments, in particular, should lose no time in doing preliminary work such as establishing the secondary highway system to be recommended for approval by the Secretary of Agriculture, preparing plans for bridges, grade-elimination structures, plans for widening of existing bottle-necks, or for by-passing congested areas.

The entire cost of these projects will be paid out of the $400,000,000 item provided in the total federal fund of 3 billion 300 million dollars for public works construction.

What Pressure on Concrete Forms?

Long-Used Pressure Diagram of Major Shunk Believed Much Too Severe—Modern Cement Shortens Time of Initial Set—Acceptance of Smith Formula Urged

THE lateral pressure on forms, due to freshly placed concrete, is a subject that has given rise to much difference of opinion and frequent disputes. Considering the number of variable factors that determine this pressure, differences of opinion are inevitable.

Perhaps the main source of difficulty lies in the fact that the form pressure diagram most frequently cited as authority requires forms to be designed for pressures far in excess of actual necessity, as determined from recent tests and from construction experience. Contractors, quite properly, object to being put to the expense of building form work which experience tells them is much stronger than necessary.

Shunk Pressure Diagram Too Severe

The form pressure diagram just mentioned as being excessively severe in its requirements was developed on the basis of tests conducted in 1908 on some lock construction between St. Paul and Minneapolis, by Major Francis R. Shunk,[1] of the corps of engineers, U. S. Army.

The Shunk pressure diagram is reproduced on page 448 of "American Civil Engineers' Pocket Book." The concrete used in the tests was a 1:3:5½ mixture, and very wet, the workmen sinking in to a depth of about 18 in.

Conclusions reached were that the lateral pressure on the form work was the full hydraulic pressure of a liquid weighing 150 lb. per cu. ft., until initial set begins. It is explained that if the forms are to be filled before initial set occurs, the forms must be designed for a hydrostatic head equal to the full height of the wall, or the height above the level under consideration. If setting begins while the work is in progress, the maximum pressure will be less than the full hydrostatic pressure. Based on these considerations, the Shunk diagram was constructed, with maximum pressure on forms plotted against rate of vertical placement of concrete. Five curves are plotted, representing, respectively, temperatures of 80, 70, 60, 50 and 40 deg. F.

The discussion accompanying the diagram on page 448 of the American Civil Engineers' Pocket Book is not clear as to whether the temperature referred to is meant to be the temperature of the outside air or that of the concrete in the forms. The original report of the tests clears up this point. The temperatures considered are the outside air temperatures.

Why Shunk Diagram No Longer Applies

In this respect the Shunk pressure diagram is seriously at fault, inasmuch as the temperature of the concrete in the forms is the factor that determines the time when the concrete takes its initial set. Strict adherence to that diagram would take no account of the actual temperature of the concrete, or of measures taken to heat the materials, or to keep the concrete warm after it is placed.

In another respect the Shunk diagram is not applicable to present-day concrete construction, because from the pressure values shown it is evident that the elapsed time between placement and initial set is regarded as ranging from 1 to 2 hours, whereas more recent tests indicate that with modern portland cement this initial set or stiffening occurs in from 30 to 45 minutes after placement. Thus, with all other variables equal, form design requirements based on the Shunk diagram are two or three times as severe as requirements based on initial set periods of 30 to 45 minutes.

It may be said, too, that the Shunk form pressure diagram was not universally accepted at the time of its early publication. For instance, in an article in *Engineering Record* of May 28, 1910, R. H. Brown says: "The experiments of Major Shunk, while most admirably and extensively performed, can not be made the final basis for concrete pressure determination."

Present-day practice in form design should be governed by tests of comparatively recent date, in order that modern cement and modern construction practice may be taken into account.

Conditions That Affect Pressure

Two very practical and comprehensive reports of tests of pressure on concrete forms appear in the March (1920) and March (1931) issues of *Public Roads*, both reports being based on tests conducted by the U. S. Bureau of Public Roads. The earlier report is an article by Earl B. Smith, in which the author develops an empirical formula for estimating the lateral pressure on concrete forms.

Smith finds that the following factors affect the lateral pressure on forms:

(1) Increases with increase in rate of vertical filling.

(2) Increases slightly with increase in mass of concrete when consistency is wet and sloppy (effect too small to be considered.)

(3) Pressure increases as consistency is made drier, within limits of workability. (Contrary to what might be expected, but that is what the tests indicated.)

(4) Maximum pressure increases with richness of mixture.

(5) Pressure increases as temperature of concrete decreases.

(6) Variations in weight of concrete are not taken account of in the Smith formula, which is based on concrete weighing 150 lb. per cu. ft. In view of present-day light-weight concrete, the pressure computed by the formula should be reduced in direct proportion to the weight.

Initial Set in Thirty Minutes

After pointing out that under ordinary temperature and placing conditions cement begins to set and stiffen in about 30 minutes after the concrete is placed, Smith explains that the maximum pressure occurs at the base of whatever depth of concrete is placed in that time. This depth he calls the "head of concrete," and in his formula it is designated by the symbol *H*.

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[1] See article by Major Shunk, *Engineering News*, September 9, 1909, page 288.

From what has just been said regarding the time within which the maximum pressure occurs, it will be seen that under ordinary conditions the value of H should be taken as half the value of R in the formula, the symbol R being used to designate the depth of concrete placed per hour. This is called the "rate of vertical fill." However, in cases where ordinary portland cement is used in cold weather, or where the concrete is well and continuously agitated, Smith recommends a value of $H = \frac{3}{4}R$. Common sense and good judgment must be applied to the formula when selecting the value of H.

Smith Formula Based on Tests

From the facts disclosed by the tests, and the deductions just explained, Smith offers the following empirical formula as a means of computing the lateral pressure on concrete forms, where the weight of the concrete is around 150 lb. per cu. ft.:

$$P = H^{0.2} R^{0.3} + 0.12C - 0.3S$$

In this formula P is the resultant lateral pressure in lb. per sq. in.; R is the rate of vertical fill per hour, expressed in feet; H is the "head of concrete," or the depth from the surface of the concrete to the point where the cement has begun to stiffen and set; C is 100 times the ratio between the volume of cement and the combined volumes of fine and coarse aggregate; and S is the slump of the concrete, expressed in inches. Both C and S may be taken to the nearest whole number, inasmuch as refinement of computation is not justified where so many variable factors enter the picture. For example, in a 1:1½:3 mixture, $C = 22.2$; but the value of 22 may be used in the formula, if desired.

For convenience, values of $H^{0.2}$ and $R^{0.3}$ are given in Table 1 for the indicated values of H and R.

TABLE 1

Value of H	Corresponding Values of $H^{0.2}$	Values of R	Corresponding Values of $R^{0.3}$
2	1.15	2	1.23
3	1.25	3	1.39
4	1.32	4	1.52
5	1.38	5	1.62
6	1.43	6	1.71
7	1.48	7	1.79
8	1.52	8	1.87

Examples in Use of Smith Formula

Two examples will now be given, to illustrate the use of the Smith formula. For the first example, assume a wall in which the rate of vertical placement of concrete (rate of vertical fill) is 4½ ft. per hour, mixing proportions are 1:2:4, and the slump is 8 in. From these conditions, R is 4½, C is 16 2/3, and S is 8. It is further assumed that the concrete will be continuously agitated during the placing operations and that the temperature of the air averaged around 50 deg. F., so that the value of H will be taken as $\frac{3}{4}R$, or 3½ ft. The values of $H^{0.2}$ and $R^{0.3}$ (from Table 1) are, by interpolation, found to be 1.28 and 1.57, respectively. Substituting these values in the Smith formula —

$$P = (1.28 \times 1.57) + (0.12 \times 16\,2/3) - (0.3 \times 8)$$

Or, $P = 1.61$ lb. per sq. in.

Or, $P = 232$ lb. per sq. ft.

If the conditions assumed were such that the concrete could be expected to begin to set and stiffen in 30 minutes or less, so that H could be taken as $\frac{1}{2}R$, and if the slump were 3 in. instead of 8 in., the computed pressure would be 425 lb. per sq. ft.

A second example is that of a reinforced concrete column 12 ft. high, which is completely filled in 20 minutes, so that in this case R is 36 ft. and H is simply the full height of the column, or 12 ft., since the column is filled in less than 30 minutes. Assume a mixture of 1:2:3 and a slump of 6 in., so that C is 20 and S is 6. From a table of logarithms, $H^{0.2}$ and $R^{0.3}$ are found to be 1.64 and 2.93, respectively. Substituting these values in the formula—

$$P = (1.64 \times 2.93) + (0.12 \times 20) - (0.3 \times 6)$$

Or, $P = 5.40$ lb. per sq. in.

Or, $P = 778$ lb. per sq. ft.

Smith and Shunk Compared

The values obtained from the Smith formula and the Shunk diagram are compared in Table 2. The values from the Smith formula are based on the special conditions explained in the note at the foot of the table. While those conditions are about average, it is suggested that each case should be worked out separately on the basis of known or expected conditions as to mixing proportions, slump, and other variables.

TABLE 2. LATERAL PRESSURES ON CONCRETE FORMS

Vertical fill of concrete, in ft. per hr.	Pressure in Lb. per Sq. Ft. as Determined from Smith Formula			Pressure Values as Taken from Shunk Diagram	
	Slump 3 in.	Slump 6 in.	Slump 9 in.	70 deg. F.	50 deg. F.
2	350	220	90	560	690
3	395	265	135	720	900
4	430	300	175	870	1,110
5	465	335	205	1,000	1,300
6	490	365	235	1,100	1,460
7	515	390	260	1,180	1,600
8	545	415	285	1,230	1,720

NOTE: The values obtained from the Smith formula are based on a period of 45 minutes between placing and initial stiffening, so that $H = \frac{3}{4}R$. This is the worst case assumed by Smith. The mixture assumed is 1:2:4, and the weight of the concrete is 150 lb. per cu. ft. For light-weight concrete, take proportionately smaller values.

As previously stated, Smith uses a range of 30 to 45 minutes for the initial set (from which he determines the value of H in terms of R). This assumed time is in reality based on tests conducted by W. E. Rosengarten, of the U. S. Bureau of Public Roads, and it is corroborated in more recent tests conducted by the Bureau of Public Roads and reported by L. W. Teller in the March (1931) issue of *Public Roads*. The Teller report shows that the concrete starts to set and stiffen about 30 minutes after it is placed, and that a rapid reduction in lateral pressure then sets in.

Corroborated by Teller Report

The tests reported by Teller also substantiate the claim that the Shunk diagram is seriously at fault in that it places far too much stress on the temperature of the outside air and disregards the actual temperature of the concrete in the forms. The Teller report discloses that this question was investigated in cases where concrete was placed at air temperatures of 49 deg. and at 74 deg. F., and that very little difference in pressure was observed.

In view of this corroboration, and in view of the more rapid setting of modern cement, the Smith formula may be considered worthy of general acceptance until further tests demand a change.

How Fineness of Cement Affects Strength of Concrete

Percentage of Fine Flour Controls Strength of Cement—Greater Fineness Also Improves Workability—Detailed Tests on Subject Needed

By W. E. CORBETT, M. Am. Soc. C. E.
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IN these days of emphasis on concrete design, high early strength, and quick removal of concrete forms, almost nothing has been said about the fineness of grinding of the cement used. Specifications for concrete have very little, if anything, to say about the fineness of the cement, when actually the percentage of cement passing a 200-mesh sieve has a very vital relation to the early strength and general use of the concrete to be deposited.

Prof. Abrams says in his discussion of "Central Mixing Plant Concrete," by Prof. Willis A. Slater,[1] that a recent investigation, made in 1930, covering grinding of the same clinker to cements varying from 80 to 95.6 per cent passing through a 200-mesh sieve, shows that certain increases in strength occur for each 1 per cent increase in fineness as measured by the amount passing the 200-mesh sieve. His table is as follows:

Age of Concrete	Increase in Strength of Concrete for Each 1 Per Cent Increase in Fineness of Cement
1 day	2.8 per cent
2 days	3.3 per cent
3 days	3.0 per cent
7 days	2.4 per cent
28 days	1.7 per cent
3 months	1.7 per cent
1 year	1.3 per cent

M. A. Swayze, assistant chief chemist, International Cement Corp., agrees, in the same discussion, that the coarser particles of cement have very little hydraulic action, at least in the earlier stages.

This would indicate that concrete made from a cement which had 87 per cent passing a 200-mesh sieve might have an assumed compressive strength of 2,000 lb. per sq. in., and the same aggregate and water content would produce a concrete with a compressive strength of around 2,250 lb. per sq. in. if the cement used had 92 per cent passing a 200-mesh sieve. A 3,000-lb. cylinder would stand 3,375 lb. if the cement used in the first case was 87 per cent and the second case 92 per cent through the 200-mesh screen. These comparisons are for 7-day strengths, but the difference would be even more pronounced if tests were made at earlier periods. For longer periods the difference would be less, but still too great to be ignored.

It should also be noted that the water content may be reduced and the same workability maintained when the finer ground cements are used.

Actually, a 200-mesh sieve is not the dividing line between active cement and inert clinker. It is only a commonly used indicator and a sieve size which can be purchased and used fairly easily. The real gain in concrete strengths is caused by the fine flour included in the cement, but finer than can be determined by any ordinary sieve or method of screening available in job or local laboratories.

Practical Limitation to Degree of Fineness

There is a limit to the fineness of grinding permissible in ordinary portland cement.[2] This limit is somewhere between 94 and 97 per cent passing through a 200-mesh sieve, depending on the chemical composition of the cement. When this limit is reached the cement has a greater affinity for water, and it may absorb enough dampness from the air to affect it while in the storage shed. Also, it is possible to get a cement so finely ground that a flash set—that is, an initial set of the cement—will result before the concrete has attained full settlement or before it has been properly compacted.

Present-day compressive strengths of 3,000 lb. per sq. in. in 7 days were almost unheard of in 1928 in any but laboratory tests. They are now quite common in reasonably well controlled concrete plants, and have been attained fairly consistently in road and mass concrete construction.

Taking Advantage of Higher Strengths

Increasing the fineness of cement from 87 to 92 per cent through a 200-mesh sieve would allow Prof. Abrams' formula $\frac{14{,}000}{7^x}$ to be written $\frac{14{,}000}{6^x}$.

We have used the formula $\frac{30{,}000}{\text{gals. per sack}} - 1{,}700$ for about two years and have required cement to pass at least 91 per cent through 200-mesh. Prof. Abrams' corresponding formula was $\frac{27{,}700}{\text{gals. per sack}} - 1{,}700$ and was correct for grindings of 1928. Actually, our tests are exceeding the designed strengths and we probably would be correct in using at least $\frac{33{,}000}{\text{gals. per sack}} - 1{,}700$ in our design, as long as we did not change aggregate, relax mix control, or purchase cement coarser than 91 or 92 per cent through the 200-mesh sieve.

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[1] *Proc.* A. S. T. M., Part II, 1931, p. 533.

[2] For size distribution of average portland cement of the present day, see April (1931) issue of CONCRETE, page 16.

A series of elaborations on Prof. Abrams' results of 86 to 96 per cent grindings, showing time of attaining various percentages of design strength, increase of strength gain against the time element, reduction of water added to attain a uniform workability as fineness increases, limits of fineness permissible both as to warehouse dampness and flash set, and commercially practicable limits of grinding for present-day machinery without sale price increase, undoubtedly would be of great technical interest and commercial value to all cement users.

Need More Data on Fineness

We were satisfied with water-bound macadam roads until we got concrete roads; we were satisfied with four-cylinder automobile engines until we found how much better six and eight-cylinder engines worked; and we were satisfied with coarser ground cement until we found we were buying a percentage of fine rock and thinking it was active cement. Now that we have found that finer cements give greater strength at shorter curing periods, we are much interested in taking advantage of the progress. In order that new standards may be set up which will be true for all cements of the same fineness and flour content, much investigation and testing must be done and the results co-ordinated, checked, and then released for public knowledge. Certainly coarser ground cement can no longer be sold to the more intelligent users and furnish any competition to the finer ground cements from which greater concrete strengths are being attained.

A. S. T. M. to Offer Varied Program on Cement and Concrete

A widely diversified program dealing with the scientific production of concrete and with the testing of cement, aggregates, concrete and concrete products will be presented at the thirty-sixth annual meeting of the American Society for Testing Materials, at the Stevens Hotel, Chicago, during the week beginning June 26.

Papers and reports on problems pertaining to cement and concrete are scheduled for Tuesday and Friday of convention week, in the 6th, 13th and 14th sessions. The subjects covered are as follows:

Sixth Session, Tuesday Morning, June 27

Informal Report of Committee C-12 on Mortars for Unit Masonry. R. E. Davis, Chairman.

Permeability of Masonry Walls—A Hypothesis. W. C. Voss, Massachusetts Institute of Technology.

Discusses the various characteristics of the brick and mortar included in the investigation. Describes the various tests used.

Thirteenth Session, Friday Morning, June 30

Status of Specifications for Hydraulic Cements in the United States. P. H. Bates, U. S. Bureau of Standards.

Discusses the inadequacy of one cement specification for all uses. Compares the major uses of hydraulic cements to date with those of two or three decades ago. Discusses the qualities offered by cements and their relation to the conditions that cement must meet in use.

The Effect of Adding Siliceous Materials to Cement Upon the Strength and Other Properties of Concrete. R. W. Carlson and G. E. Troxell, University of California.

Presents results of co-ordinated tests made to determine the effect of siliceous materials upon the properties of cement. The properties investigated are: Compressive strength of concrete or mortar, heat of hydration, volume change of concrete or mortar due to causes other than temperature and load, durability of concrete or mortar.

Report of Committee C-1 on Cement. P. H. Bates, Chairman.

Recommends adoption as standard of tentative specifications for high-early-strength portland cement.

The Turbidimetric Fineness Test. L. A. Wagner, U. S. Bureau of Standards.

Describes the turbidimeter method which was developed at the Bureau of Standards for determining the fineness of cement.

The Durability of Cement Mortars; the Cement and Method of Testing Major Variables. C. A. Hughes, University of Minnesota.

Discusses the relation between the durability of mortars as measured by freezing and thawing and submersion in 10 per cent sodium sulfate solution; the constitution and other properties of the cement; and the strength, voids, and other properties of mortar.

Fourteenth Session, Friday Afternoon, June 30

Report of Committee C-9 on Concrete and Concrete Aggregates. R. W. Crum, Chairman.

Presents new tentative specifications for light-weight aggregates and for ready-mixed concrete and new tentative methods of test for absorption of aggregates and field test of absorption of mixing water by aggregates.

Report on Significance of Tests of Concrete and Concrete Aggregates.

The purpose of this compilation is to present an effective summation of the significance, limitations, and applicability of the more widely used tests for concrete and concrete aggregates.

Further Studies of Paving Concrete. F. H. Jackson and W. F. Kellerman, U. S. Bureau of Public Roads.

Discuss a series of tests conducted along the same general lines as the series reported before the society in 1931. Present results of tests made on 106 concrete pavement sections to determine the effects of two different methods of placing the concrete; 66 of the sections were placed by using high-frequency electric vibrators mounted on the screeds of a standard finishing machine; and 40 of the specimens were placed by using a method of finishing, known as the "Johnson" method, designed to eliminate excess water.

Apparatus for Fabricating and Testing Mass Concrete Cylinders. R. F. Blanks and E. N. Vidal, Bureau of Reclamation.

Calorimeter Installation in the Engineering Materials Laboratory of the University of California for Studies of Heat Generation in Mass Concrete. S. B. Biddle, Jr., and J. W. Kelly, University of California.

Describes the system of calorimeters and curing chambers employed, in cement investigations for the Hoover Dam, at the University of California for measuring the heat generated by cements during hydration.

From the Patent Office

By J. KAPLAN
Patent Attorney, Washington, D. C.

HYDRAULIC CEMENT MORTAR AND METHOD OF COMPOUNDING THE SAME SUBSTANTIALLY FREE FROM UNCOMBINED LIME—No. 1,908,636. Frederick C. Langenberg, Edgewater Park, and Horace S. Hunt and Herbert G. Reddick, of Burlington, N. J., Assignors to U. S. Pipe & Foundry Co., of Burlington, N. J.

The method of compounding the cement mortar consists in mixing with the ingredients during the compounding of the mortar a substance rich in monocalcium silicate and, in addition to such substance, uncombined phosphoric acid dissolved in the water used in compounding the mortar.

●

PRODUCTION OF CEMENT—No. 1,904,699. James A. Singmaster, of Bronxville, New York.

James A. Singmaster has invented a process for manufacturing cement, which consists of mixing a slurry of pulverized raw cement materials with sufficient finely divided solid fuel to produce, upon combustion, sintering of the cement mixture, filtering the mixture, igniting the fuel in the filter cake, drawing air through the mixture to support and promote the combustion of the fuel, and subjecting the sintered mass to further heat to complete the burning of the cement.

Long Beach Earthquake a Triumph for Concrete Construction

Losses Due to Use of Improper Construction Types—California Architect Finds Concrete Buildings Undamaged—No Part of Country Immune from Earthquakes

By EVA P. DALE
Point Loma, California

CONCRETE carried an article in the March issue entitled "Concrete House Construction Move Waits Education"; but since that time an event has occurred which has proved a startling object lesson to southern California and to the entire country. It will lend a powerful impetus to concrete house construction, if the facts become generally known. The event referred to is the earthquake of March 10, 1933, in the vicinity of Long Beach, California.

This earthquake, though not of maximum intensity, cost the lives of 116 persons, and caused injury to thousands of others, and property damage to the extent of 50 million dollars. In the light of these facts, the declaration of John R. Freeman in his book entitled "Earthquake Damage and Earthquake Insurance," published in 1932, takes on new significance. He states that "The vast majority of the structures which have been damaged by earthquakes in all parts of the world have been of weak, inferior construction."

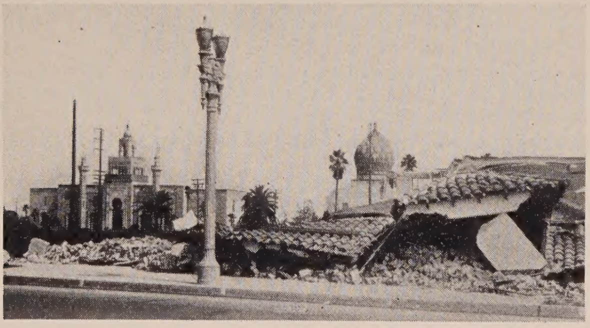


Figure 1. Brick buildings collapsed opposite Angelus Abbey Mausoleum, in Compton, Calif. The mausoleum, a monolithic concrete structure, is seen in the left background

Since the Long Beach disaster, the statement has been reiterated by numerous investigators that almost the entire loss of life and property might have been avoided had different methods of construction been used. The pictures accompanying this article, taken shortly after the disaster, will show some of the types of construction which failed. Bricks were shaken down like children's blocks. Hollow clay tile also gave way and wood frame houses were moved off their foundations; but damage to reinforced concrete was conspicuously absent.

Furthermore, one of the leading architects of California, Richard S. Requa, after two tours of inspection through the Long Beach area, states that he found no reinforced concrete buildings which had failed, or would even have to be repaired, except in cases where there was a brick veneer. In such cases the bricks frequently fell away but the interior of the buildings remained intact. In Mr. Requa's own words, "It is another triumph for concrete."

No Part of Country Immune

It is true that the danger from earthquakes is very much greater near active geologic faults, but it is also true that some extremely destructive earthquakes have occurred at places where there was no previous reason for expecting one, as for example, at Charleston, South Carolina, and at New Madrid, Missouri. We are told that "No locality within the United States or the southern portion of Canada is beyond the possibility of earthquake hazard." So it would seem the part of wisdom to use that construction, when building, which adds to all its other virtues that of being extremely earthquake resisting. Quite clearly, that construction is reinforced concrete.

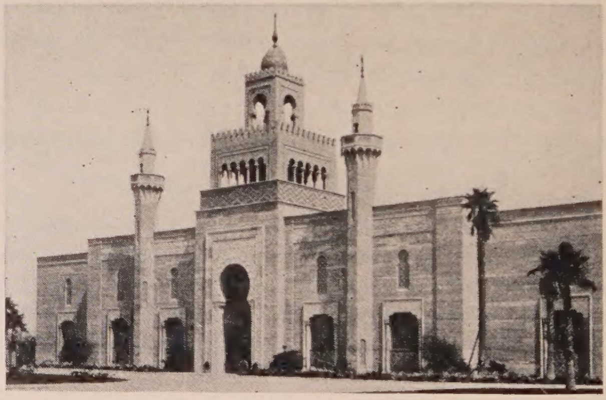


Figure 2. Angelus Abbey Mausoleum, Compton, Calif., a monolithic concrete structure, shown undamaged in earthquake. This building appears in Figure 1

Wisconsin Products Makers Hold Annual Meeting

The Wisconsin Concrete Products Association held its annual spring meeting at the Wisconsin Hotel at Milwaukee on May 9.

The major part of the conference was devoted to discussion of the future concrete masonry home, colored concrete and concrete ashlar.

EDITORIAL

Modernizing and Extending Commercial Buildings

AN appreciable stimulant is being given to business recovery through the home-modernizing campaigns now under way in a number of cities. The favorable effect will increase in volume as additional campaigns get into action.

The remodeling and upward extension of old commercial buildings constitutes another field that should have equally large possibilities during the years immediately ahead of us.

Every city has a rim of old business buildings bordering on the central retail business district, occupied by wholesale houses and various other classes of occupancy that do not deal with the public.

Some ten or twelve years ago a single firm of engineers was responsible for the promotion and construction of a number of remodeling projects in old buildings of this type in Kansas City. In general, the procedure consisted of replacement of the old wooden floors with new floors of reinforced concrete of flat-slab design, the old floors having been utilized as forms for the new. Wall columns of reinforced concrete were built against the inside face of the exterior walls of brick, and interior columns of concrete were built wherever the building was wide enough to require them. Use of the building was suspended on only one floor at a time.

The upward extension of an old building provides an increase in floor area without occupying more ground area. In many instances an analysis of loads and stresses will disclose that, under modern building regulations, additional loads may be imposed on existing walls, columns, and footings. The development of light-weight concrete aggregates has provided added possibilities in this direction.

Both of these fields—the interior reconstruction of old buildings having wooden floors, and the upward extension of existing buildings—offer opportunities to aggressive architects and engineers.

Why Not a Show-Down?

THE attorney general of Minnesota has ruled that gasoline tax allotments to counties may be used only for the construction, improvement and maintenance of county-aid roads. Such funds, according to the opinion, can not legally be diverted to any other governmental purpose.

The Minnesota attorney general further ruled that the county may not borrow from its gasoline tax allotments for other governmental purposes.

Here are two legal points that should be pushed to the limit. Friends of the nation's roads have everything to gain and nothing to lose in forcing this whole matter of gasoline tax diversion to a show-down.

The Government in Washington Means Business

THE sum of 3 billion 300 million dollars provided for public works construction in the proposed National Industrial Recovery Act brings to the construction industry the great opportunity for which its leaders have been fighting for nearly two years. To the entire nation it brings renewed assurance that the government in Washington means business.

Projects to be prosecuted under the measure introduced on May 17 include the construction and widening of main highway arteries through and around congested traffic areas, grade-elimination structures, bridges, secondary road systems, public buildings, low-cost housing and slum-clearance projects, waterworks and sewage disposal plants, public docks and shipping terminals, electric power developments and conservation of other natural resources, and a host of other projects.

The bill contemplates single-headed responsibility in the execution of the program, in the person of a federal emergency administrator of public works. With an aggressive administrator at the helm in Washington, a pace will be set which should shake the construction industry out of its long slumber.

In the $400,000,000 item for highway construction will lie the foremost opportunity for action, for in this field the preparation and approval of plans and programs is simple, and the federal government will pay the entire cost of construction. Not a single cent will need to be matched by the states. As suggested on the cover page of this issue, state highway departments that fail to act under these favorable conditions could rightfully be accused of taking an attitude approaching criminal indifference.

Public works officials of smaller governmental units, likewise, must bestir themselves to the point of completing and submitting plans for long-deferred public improvements, such as waterworks and sewage disposal plants, or to re-submit plans now awaiting action by the R. F. C.

Private initiative, in its turn, will be given ample encouragement to enter the picture, with slum-clearance projects and other low-cost housing developments, electric power projects, docks and terminals, toll bridges, and other useful structures.

And above all, every possible phase of preliminary work should be done now. There is no need of waiting until the new measure is passed by Congress, for it will be adopted essentially in its present form.

PROGRESS—In a Page

Current activities in research, in matters pertaining to concrete and cement, as being carried on or completed by various organized groups.

Approve New Standard Dimensions for Concrete Building Units

SIMPLIFIED Practice Recommendation R32-32, Concrete Building Units, has been issued under date of April 6, 1933, by the Division of Simplified Practice, National Bureau of Standards, Washington, D. C. The new standard R32-32 is a revision of R32.

This revision consists of a number of changes in standard sizes for block and tile, all new sizes having been listed on this page in the April (1932) issue of CONCRETE, at the time the changes were formally proposed. Tolerances have also been changed.

For both load-bearing and non-load-bearing block and tile the new standard dimensions are—

Width, Inches	Height, Inches	Length, Inches	Width, Inches	Height, Inches	Length, Inches
12	7¾	15¾	7¾	5	11¾
10	7¾	15¾	5¾	5	11¾
8	7¾	15¾	3¾	5	11¾
6	7¾	15¾			
4	7¾	15¾	7¾	3½	11¾
3	7¾	15¾	5¾	3½	11¾
			3¾	3½	11¾
8	11¾	23¾			
6	11¾	23¾			
3	11¾	23¾			
2	11¾	23¾			

Tolerance. The permissible variation over or under the above dimensions is ¼ in. for block and tile.

Concrete Brick. For both face and common concrete brick the dimensions are the same as in the old standard, namely, 3¾ by 2¼ by 8 in.; but the tolerance has been changed. The permissible variation over or under the dimensions given shall not exceed ⅛ in. in width, 1/16 in. in height, nor ¼ in. in length.

Copies of the revised standard R32-32 may be obtained at 5 cents each from the Government Printing Office, Washington, D. C.

Tests of Concrete to Extend Over 113-Year Period

UNDER the direction of M. O. Withey, professor of mechanics at the University of Wisconsin, 2,050 concrete test specimens have been prepared for use in a testing program to extend over a period of 113 years.

The purpose of the tests is to determine, if possible, the proportions and materials that produce the most durable concrete.

Bituminous Cement Mortar

A CEMENT mortar that is said to undergo comparatively little change in volume with changes in temperature is covered by a British patent (No. 378,107), granted to H. Plauson and M. Imer.

The cement is produced by grinding a bituminous material such as pitch or tar (preferably in the liquid state) with lime, then mixing this finely ground product with portland cement. Copies of British patents may be obtained by addressing Patent Office, Industrial Property Department, Board of Trade, 25 Southampton St., London, England.

Cement Testing Standard Approved

THE American Standards Association recently approved the A. S. T. M. Standard Methods of Sampling and Testing Portland Cement (C77-32) as a revision of the American Standard Methods of Testing Cement (Alb-1931). The title of the revised American Standard has been changed to Methods of Sampling and Testing Portland Cement and the new ASA designation is A1.2-1933. The revision just approved was acted upon by the sectional committee following its consideration by A. S. T. M. Committee C-1 through a two-year period preceding its adoption by the American Society for Testing Materials in June, 1932.

Copies of the new standard may be obtained from the American Society for Testing Materials, 1315 Spruce Street, Philadelphia, or from the American Standards Association, 29 West 39th Street, New York, at 25 cents each.

Steel Reinforcing Spirals

SIMPLIFIED Practice Recommendation R53-32 (second edition), covering the subject of steel reinforcing spirals, has been issued under date of April 6, 1933, by the Division of Simplified Practice, National Bureau of Standards, Washington, D. C. This new standard supersedes R53. It was approved on January 4, 1933, as American standard A38-1933 by the American Standards Association.

Information is given on rod sizes of ¼, ⅜, ½ and ⅝ in.

Copies of R53-32 (second edition) may be obtained at 5 cents each from the Government Printing Office, Washington, D. C.

Waterproofing Composition

GERMAN patent No. 553,360 has been granted to cover a process for the production and application of a composition intended to provide a waterproof coating to the surface of concrete and unit masonry.

The composition contains portland cement, a gelatinous material such as glue, and a silicate or fluosilicate that is wholly or partly soluble. The composition may be prepared by adding the gelatinous material and the silicate or fluosilicate to the water used in mixing the cement.

Copies of German patents may be obtained by addressing Reichspatentamt, Gitschinerstrasse 103, Berlin, S. W. 61, Germany.

Bright Prospects for Home Building Seen by Housing Conference

Total Registration of 534 from 16 States Testifies to Interest in Homes—Permanent Organization Formed

THE surprising success of the National Conference on the Renewal of Home Building, held in Chicago on May 9 and 10, acted as a stimulant to all who attended the well-planned sessions. The papers and discussions presented were practical and of a high standard of quality, and held the close attention of the delegates.

Form Permanent Organization

A total registration of 534 visitors, coming from 73 cities in 16 states, testified clearly to the public interest in new things in homes and home building; and as an outgrowth of the gratifying interest displayed, the concluding session of the conference came to a unanimous decision to continue this great work through the establishment of a National Housing Conference Board.

Summary of Conference Papers

Here is a summary of authenticated statements developed at the conference by various authorities assembled from all parts of the country, and covering several special national surveys made for the meeting:

1. On conservative estimates the country is short 500,000 homes. Vacancies are greatly decreasing, so that nearly normal vacancy figures prevail in many areas.

2. Taxes on real property have been reduced in states throughout the country, and this movement will continue. Within the next two years the tax bills of home owners everywhere probably will be reduced by an average of one-fourth.

3. The 12 Federal Home Loan Banks located throughout the country will be able to lend direct to home owners and home builders, if the Administration bill now pending is passed; and these banks could immediately loan much larger sums if many home financing institutions would change their methods to conform with the changing times. It was predicted that this will be done.

4. Evidently unknown to everyone, there has been going on in many parts of the country, during the darkest days of the depression, research that has resulted in the development of fine new materials, amazing pieces of equipment, and economical new methods for home construction.

5. There will be more demand for $5,000 homes and homes of approximately this cost, with vegetable garden space, than for any other kind of homes, when building programs are resumed.

Community Developments Predicted

The 534 architects, engineers, contractors, material dealers, real estate men, building and loan officials, union labor representatives, manufacturers, editors and social workers attending the conference were given a picture of what the future holds for the home owning public and for the thousands of people normally employed in the construction industry. They were presented with a picture of communities of homes dotting the country, in which not only the exterior and the interior of the home will be carefully planned, but the entire community will be planned with respect to educational and recreational facilities, transportation, marketing and gardening.

Louis Brownlow, director of the public administration clearing house at the University of Chicago, described this new organization of peoples' lives in connection with providing quarters for them, and predicted that such programs of keeping people occupied will enormously enhance the value of all real property in the United States by keeping neighborhoods high class.

Dr. L. C. Gray, noted land economist of the Department of Agriculture, Washington, D. C., also predicted national changes that would end the sharp difference between city people and country people, and also end the chances of a recurrence of the worst phases of the depression.

Reduced Taxes Will Help

Herbert U. Nelson, secretary of the National Association of Real Estate Boards, predicted a 25 per cent cut in the property-tax bills of home owners within the next 2 years. One of the most significant changes in this connection, he showed, is the move to transfer all or part of the costs of public schools to state governments, which at once takes many dollars from the annual levy on the home owner. Such a change has been made in North Carolina, Virginia, Indiana, and the state of Washington, and is progressing to this end in California.

A new law in Oregon considers the use of the property in valuing it for tax purposes. It is predicted that this procedure, which would inevitably decrease the home owner's taxes, may become widespread.

The Awakening Interest in Homes

John Millar, of Millar's Housing Letter, presented data showing an awakening interest in homes and the things that go into homes, on the part of the public. His paper included reports from architects, national women's publications, a department store home-building department, and a home building show held in Indianapolis in April.

Sears, Roebuck & Company reported in this connection a pick-up in demand for low-cost homes, with many inquirers having cash in full for such purposes.

The new permanent Housing Board will have a membership of 15, and will have headquarters temporarily at 310 South Michigan Boulevard, Chicago.

Precast Slabs Build Walls and Floors of Large Concrete Residence

Double Steel Reinforcement in Walls and Partitions and Two-Way Reinforcement in Floors Are Features—Precast Pan-Shaped Units for San Antonio Residence Are Made on Building Site

HOLLOW precast concrete pan-shaped slabs, molded on the construction site and used in walls, partitions, floors and roof, constitute a type of reinforced concrete house construction under development in Texas. An interesting example is the 7-room residence, including a double garage attached, for H. C. Thorman, builder and real estate man, of San Antonio, Texas.

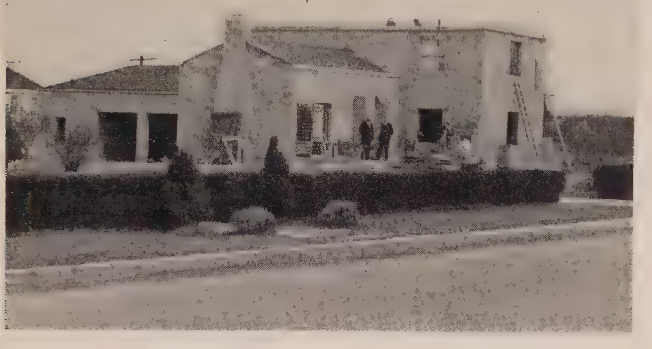


Figure 1. Thorman residence in San Antonio, built of precast concrete wall units, reinforced, and special concrete floor construction

The standard size wall unit used in the Thorman residence measures 12 by 24 in., with an edge thickness of 3 in. Special units are cast for door and window openings, corners, and other special locations.

How Walls Are Reinforced

Figure 2, showing partitions in the second story of the Thorman residence, illustrates the standard method of wall construction. The wall units were set up to form the two faces of the wall, with a dead air space between the shells. Each unit is grooved at top and bottom and at both ends. When a course of units was set, steel reinforcing rods were placed in each groove, thus forming continuous longitudinal reinforcement in both shells of the wall. Transverse steel was placed across the wall, tying the two shells together. The grooves were then filled with mortar, after which the next course was set.

Plumbing, heating and wiring pipes and conduits were installed as the walls were built up, and brackets and outlet boxes were set. Some of these installations may be seen in Figure 2.

Two-Way Reinforcement in Floors

The precast floor units are 24 by 24 in. in size, also with an edge thickness of 3 in. These units were assembled in such a way as to produce what is, in effect, a 2-way reinforced concrete joisted floor slab 6 in. deep, with a flat ceiling but with hollow spaces within the slab and between the concrete joists.

This was accomplished in accordance with the standard method. One set of the 24 by 24 by 3-in. hollow pan-shaped unit was placed, with the hollow side up, on 1 by 6-in. boards which were shored from below. The boards, of course, were placed so that they served as forms for the bottoms of the concrete joists.

Space Left for Two-Way Joists

The 24 by 24-in. units were set with a clear space of 4 in. between units. Then exactly similar hollow units were superimposed on each of the units in the first layer, but with the hollow space down. Reinforcing bars, ½-in. size, were then placed and secured near the bottom of the joist spaces, in each direction, after which the joist spaces were filled with concrete. It will thus be seen that the floor construction consists of reinforced concrete joists 4 in. wide, 6 in. deep, and spaced 28 in. center to center in each direction, the square spaces between joists being occupied by the hollow precast units. Because of the way in which the precast units were placed, the ceiling is

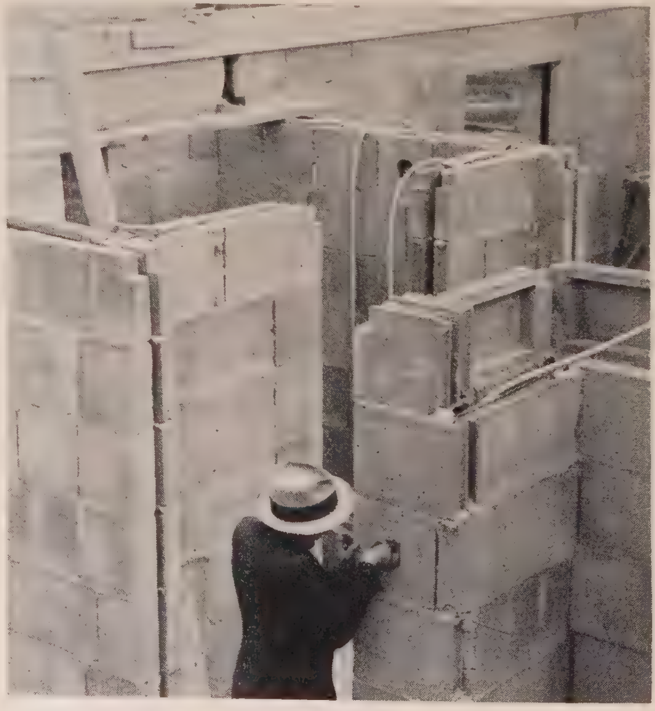


Figure 2. Second floor walls and partitions in course of construction

flat; and of course the floor surface is also flat. The shores and 1 by 6-in. form boards were removed seven days after the concrete was placed.

Partitions Are Anchored

The interior partitions were built up directly from the floor construction and extended to the ceiling construction, dowels having been placed as anchors in both the floor and the ceiling.

The roof slab is a continuous unit of standard 24 by 24-in. pans, with reinforced concrete joists running both ways, the construction being similar to that of the floors. Stair steps and floor finish are of 12 by 12 by 1-in. colored concrete tile of marble-like appearance.

The roofing tile, likewise, are of colored concrete, cast on the construction site by the same crew that makes the precast floor and wall slabs.

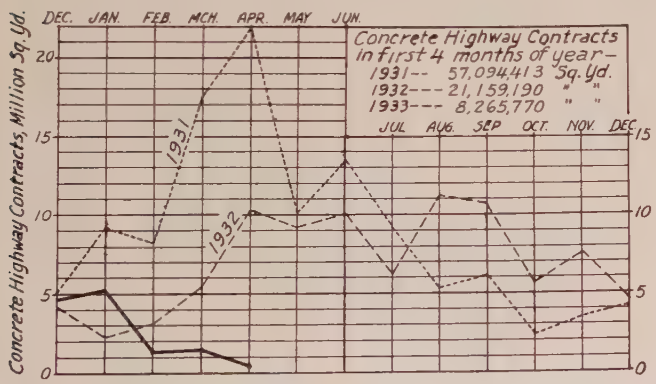
Acknowledgments

The Thorman residence was built by the Fireproof Housing Co., of San Antonio, Tex. The system of construction here described was developed by the Pancrete Wall Co., also of San Antonio.

Highway Construction Awaiting Federal Program

It is clear that during the month of April the state highway departments were awaiting the development of the construction program of the federal government. According to figures compiled by the Portland Cement Association the total contracts awarded, during that month, for concrete road construction amounted to only 379,079 sq. yd. This is the smallest monthly total recorded in some years, and it comes at the time of year when contracts normally run into high figures.

The public works measure introduced in Congress on May 17 carries an item of 400 million dollars for highway construction, although considerable emphasis is placed on features such as bridges, grade separation structures and widening of roadways in congested areas, rather than the construction of extended mileage in outlying sections.



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Unquestionably the federal program will provide a great stimulant to highway construction, but only a part of the expenditures will be expressed in yardage. A considerable part of the 400 million will go into highway structures.

✦ PERSONALS ✦

A. J. Boase has been appointed manager of the structural and technical bureau in the main office in Chicago of the Portland Cement Association, succeeding W. E. Hart who has been in charge of the bureau for a number of years. Mr. Hart will devote his entire attention to the development of architectural uses of concrete.

O. E. McMullen, formerly professor of civil engineering at Drexel Institute, has been appointed regional structural engineer at Philadelphia.

M. J. McMillan, formerly regional structural engineer at Chicago, has been transferred to a similar position in the Washington office.

J. R. Goetz has succeeded Mr. McMillan in the Chicago office.

B. E. Brevik, formerly in the Milwaukee office, has been reassigned to that office to look after structural and farm work.

I. H. Freund, president of the Federal American Cement Tile Co., Chicago, passed away at his home there on May 22. Mr. Freund was 56 years old.

F. E. Dischner, Detroit, Mich., has been elected president of the American Institute of Quantity Surveyors. He succeeds the late Oscar Euphrat.

Other new members of the organization's board of directors are as follows: H. L. Cunliffe, Seattle, Wash., first vice-president; Wm. H. Jenkins, Jr., Baltimore, Md., second vice-president; H. F. Bergen, Indianapolis, Ind., and F. Brofos, St. Louis, Mo., secretary.

Engineering Week

Engineering Week will be observed at Chicago the last week of June, when numerous groups will meet there. Each society will have its customary program but all will be co-ordinated to reserve Wednesday, June 28, for Engineers' Day at the Century of Progress.

The American Society for Testing Materials is scheduled to meet June 26-30 at the Stevens Hotel at that city.

Coming Conventions

June 19-22—National Terrazzo and Mosaic Association, Inc. Palmer House, Chicago, Ill.

June 21-24—American Society of Agricultural Engineers, 27th annual meeting. Purdue University, Lafayette, Indiana.

June 26-27—American Concrete Pipe Association, twenty-sixth annual meeting. Edgewater Beach Hotel, Chicago.

June 26-30—American Society for Testing Materials, annual meeting. Stevens Hotel, Chicago, Ill.

June 26-July 1—American Society of Civil Engineers, annual convention. Chicago, Ill.

See Beneficial Effects of Admixture in Test Run on Viaduct

By C. A. GILL
Office Engineer, City Engineering Department,
Signal Hill, Calif.

Improved Flowability and Greater Density Observed—Placing Speeded Up—Variation in Slumps of Plain and Treated Concrete—Results Agree with Writer's Experience on Sewage Treatment Works

IN a recent meeting of construction interests the question of admixtures in concrete was the subject of considerable discussion. Arguments were presented on both sides.

It is the writer's opinion that the former flood of concrete admixtures is a thing of the past, and that most of the admixtures which have survived the stress of more recent times are in fact beneficial.

The writer, in September, 1932, was present at a 3-hour test run conducted at the Sixth Street viaduct, Los Angeles, by the bureau of engineering of that city. The test involved the placing of about 200 cu. yd. of concrete in the heavily reinforced deck of the structure, an admixture sold under the trade name of Fluresit having been added to the concrete.

Effect on Flowability

It was interesting to observe the effect of the admixture, both on the appearance and flowability of the concrete and on the operations of the placing crew.

When the plain concrete in the control run, prior to the introduction of the admixture, was dumped into the forms a certain quantity invariably adhered to the bottom and sides of the hand buggies. This caused the men who were spreading the concrete to stop work and clean out the buggies with their shovels.

When the concrete treated with the admixture arrived at the point where it was to be dumped, the entire mass left the buggy the instant the buggy was upset. A man operating a buggy stopped only for the length of time required to upset the buggy and then immediately moved out of the way to make room for the man next in line. This speeded up the operation considerably.

Another difference that was very evident was the action of the mass of concrete already in the forms when a new batch was dumped on top of it. The concrete, when dumped into the forms, slid through the closely meshed reinforcing bars to the bottom of the form, and as it piled up it gravitated toward the lowest point of the form. In the control run, when plain concrete was being placed, it was noticeable that when each new batch was dumped it was necessary for men with tamping bars to assist the concrete to distribute itself over the mass already in the forms.

However, when the concrete containing the admixture was dumped on the mass in the forms each new batch not only completely distributed itself, but it caused a movement in the entire length of the mass of concrete along the line of flow, which extended in some instances approximately 40 ft. from the point of deposit. As many as four batches of concrete were dumped into the forms and distributed through the bars without the necessity of the men with the tamping rods touching them. The admixture produced a workability superior to anything the writer has ever heard of or witnessed. This workability was commented on by several other engineers who were present.

Treated Concrete Has Greater Density

In places where the forms were completely filled and the concrete had been standing for from 30 minutes to one hour, there was a considerable difference in the appearance of the surfaces of the plain and the treated concrete, the plain concrete appearing to be much the dryer. Pressure of one's thumb on the surface of the treated concrete left a very slight impression, whereas it was an easy matter to leave finger prints on the plain concrete to a depth of half an inch or more with the same pressure. This would indicate that the treated concrete possessed much the greater density.

At one time during the three hours when the admixture was being used, several batches of plain concrete were run through in order to determine the effect of the admixture on the slump. The slump on this plain concrete was 2 in., compared with a slump of 5 to 6 inches on the treated concrete.

Gas Tax Diversion Ruled Out

Gasoline tax allotments to counties shall be used only for the construction, improvement and maintenance of county-aid roads. Such funds can not in any manner be diverted or used for any other governmental purposes, the attorney general of Minnesota ruled in an opinion prepared by Assistant Attorney General O. T. Bundlie, dated Feb. 23, 1933. The ruling was made in connection with a proposal of Cass County to transfer funds from the gas tax allotment to the sinking fund, for the payment of bonds.

The attorney general further ruled that the county may not borrow money from the gas tax funds for other governmental purposes.

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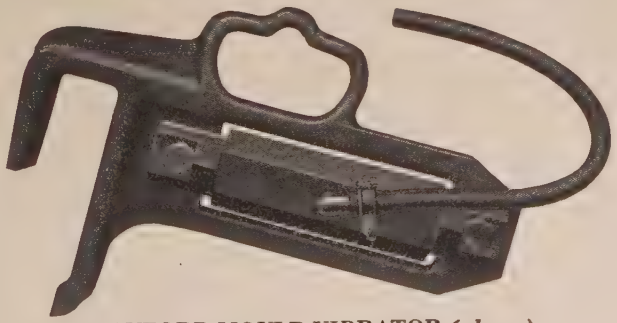

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In Concrete

Is Assured by Using

BARNSDALL ADMIX

The concrete sections of minimum strength determine the strength of the structure as a whole, regardless of the strength shown by cylinder tests. A chain is no stronger than its weakest link. Honeycombed sections do not show up in cylinder tests and are the weak links in concrete. Eliminate the weak links and increase the minimum strengths by obtaining uniformity with a low water-factor siliceous admixture of high purity.

BARNSDALL ADMIX
(97½% Active Silica)

Produced by

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Former Name American Tripoli Company, Inc. 1892
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"Be Square" Products

(Reg. U. S. Pat. Off.)

VAULT PROFITS

are Bigger than Ever

The depression has not effected mortality—people are still dying at the same rate as they did before. But, modern straight forward thinking demands safety and protection at the time of a funeral. Now, more than ever before, sentiment and custom insists on a waterproof, verminproof and pressure proof vault.

You can cash in on this ever growing demand by having a set of "Automatic Seal" or "Inverted Air Seal" molds. The profits are big—the investment is small—and it's work that turns "spare-time" into dollars. Outstanding features make them easy to sell—and we will show you how to do it, too.

Send for our profit-making book on vaults—
it opens up avenues of new profits.

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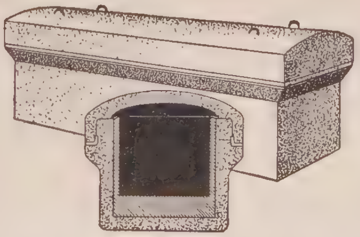

AUTOMATIC SEAL and INVERTED AIR SEAL VAULTS

HOW TO DO IT

◆ **Questions and Answers** ◆
Consultation and Comment

A department devoted to the solution of problems encountered in concrete work. Readers are welcome to add to or improve upon the suggestions printed and to submit their views for possible publication.

Prospective Market for Concrete Burial Vaults

We are contemplating the addition of concrete burial vaults to our line of concrete products.

Can you give us any authentic information on the probable market for concrete vaults? Our trade area for our present lines, including concrete building blocks, drain tile, fence posts, and the like, covers the greater part of our county.—H. S. M., Iowa.

The question you have raised can be answerd with a fair degree of accuracy on the basis of specific information at hand covering several typical counties in the Central States area.

First of all, the number of deaths in the United States averages from 10 to 12 per year, per thousand of population. This rate seems to hold fairly well for all sections of the country. In consequence, inasmuch as your trade area covers your county, and census reports give the population of your county as about 26,000, you can expect from 260 to 300 funerals per year.

It may be assumed from your letter that concrete vaults are not now being sold in your trade area, or at least that no concrete products plant within that area is making vaults.

Accordingly, the volume of business will depend on the extent to which the steel vault has been established in your county, and on the percentage of people who continue to use the older type of wooden vault, or rough-box.

Figures in our possession indicate that considerably more than 50 per cent of funerals in progressive agricultural and industrial sections now utilize either concrete or steel vaults, and that aggressive manufacturers of concrete vaults are actually selling their product for more than 50 per cent of the funerals in such communities.

For instance, in a certain county in the fruit belt of Michigan there is one manufacturer of concrete vaults in the county seat, and one outside the county who ships into that territory. Even in 1932 these two manufacturers combined sold concrete vaults for more than 50 per cent of the funerals. Comparatively few steel vaults are sold in that territory.

The Michigan county just mentioned contains no large centers of population. There is one town at the extreme end of the county that has a population of 5,000. The county seat has a population of 1,800, and four other towns have populations ranging from 1,600 down to 1,100. The population of the entire county is 32,600, and the number of funerals, per year, averages around 350. In a word, with its fertile farms and a number of villages and large towns, but no large centers of population, this county can be classified as a fairly rich agricultural community.

A second illustration is a county in north central Indiana, with a total population of 29,000, the character of the population being partly industrial and partly agricultural. The county seat has a population of about 13,000, or about 15,000 with suburban areas included, and elsewhere in the county there are five or six towns with populations ranging from 500 to 1,000, and a number of smaller villages.

There is one manufacturer of concrete vaults in this county—at the county seat—and his market is rather closely confined because concrete vaults are manufactured in every one of the surrounding counties. In the county seat and suburbs this aggressive manufacturer sells concrete vaults for 80 per cent of the funerals, while outside the city, throughout the rest of the county, he gets about 50 per cent of the total. No steel vault has been sold in the county since 1915, which speaks well for the merchandising ability of this products manufacturer as well as for the quality of his concrete vaults.

You are doubtless familiar with the usual method of selling vaults through funeral directors, who receive a commission on vaults sold to their clients.

Pressure on Concrete Forms and Shunk Formula

We have a contract on state work where the state's resident engineer is demanding that form work be designed to resist an amount of lateral pressure which seems beyond all reason. In fact, we know from our extensive experience in the construction of concrete work that the forms we are required to build are at least twice as strong as necessary—and also twice as expensive.

The state engineer, however, supports his demand by means of a diagram appearing on page 448 of the American Civil Engineers' Pocket Book. That diagram appears to be based on very old tests. Can you refer us to more recent investigations of pressure on concrete forms?—J. R. T., Columbus, Ohio.

The form pressure tests to which you refer were conducted in 1908 under the direction of Major Francis R. Shunk, and the diagram mentioned was prepared from the results of the tests. At that time cement was much slower in taking its initial set or stiffening than is the case with present-day cement, so that concrete placed in the forms exerted lateral pressure for a longer period of time than it does now. In consequence, the requirements given in the diagram you mention are much too severe for concrete work in 1933.

More recent tests, conducted by the U. S. Bureau of Public Roads, were reported in *Public Roads* in the issues of March, 1920, and March, 1931. The results show pressures much lower than those indicated by the Shunk diagram. These tests are analyzed and discussed in a detailed article to be found in other pages of this issue of CONCRETE.

BOOKS On Concrete

The books listed below have been carefully selected by our editorial staff as useful to those engaged in making concrete in all its various forms. Prices are cash in advance and include postage.

DESIGN AND CONSTRUCTION OF FORM WORK FOR CONCRETE STRUCTURES. By A. E. Wynn. 312 pages, 219 ills., 12 folded inserts and 11 design tables. Cloth bound, stamped title in gold. **Price $6.00**

"Wynn's Book" is a phrase commonly known to engineers, designers, and foremen, and is heard wherever concrete construction is under way. This book covers every phase of forms for concrete construction, and is fully and completely supplemented with many significant illustrations, tables and drawings and printed on a superior grade of enameled paper.

CONCRETE CONSTRUCTION MADE EASY. By Leslie Turner and Albert Lakeman. 113 pages, 65 illustrations, 16 tables. Cloth bound. **Price $2.00**

A practical book that solves problems in the design and erection of any type of concrete structure. Full designs with tables and all necessary information for building of foundations, walls, columns, floors, roofs, staircases, beams, water tanks, retaining walls, lintels, formwork, saw-tooth roofs, etc. A mine of information to the novice and a fruitful source of advice for the experienced. Written clearly and plainly.

MANUFACTURE AND USES OF CONCRETE PRODUCTS AND CAST STONE. By H. L. Childe. 354 pages. 265 illustrations. Color plates. Photographs. Completely rewritten and enlarged. **Price $3.00**

Deals with problems of how to: use dry mixes for architectural concrete; minimize crazing and efflorescence; design all kinds of molds; select materials; grade and proportion aggregates, regulate mixing, and govern curing; use color in concrete; manufacture columns, cornice posts, curb, blocks and slabs, brick, roofing tile, steps, sills, lintels and edgings, balustrades, sundials, bird-baths, lettered panels, ornamental work, etc. This new 1930 edition simplifies every phase of manufacture of concrete products and cast stone of every description for every purpose.

BASIC PRINCIPLES OF CONCRETE MAKING. By Franklin R. McMillan, Director of Research, Portland Cement Association.

The author has culled the essentials out of a mass of scientific data on this subject and presents them with force and directness in this book. He shows the effects of quality of material, of proportioning, mixing, working and curing on the finished concrete.

The importance of variable mixes; tests for permeability; how to obtain strength, durability and watertightness; effective ratios; importance of proper construction methods—these and many other vital topics are discussed fully and authoritatively.

The book represents not only extensive accumulated knowledge, but also wide practical experience in the field and laboratory. It is an enlargement and revision of a series of notable articles on concrete mixing by Mr. McMillan published in 1929.

Ninety-nine pages, 6x9½, 32 illustrations and tables. Postpaid. **Price $2.00**

CONCRETE MONUMENTS, MAUSOLEUMS AND BURIAL VAULTS. By A. A. Houghton. 65 pages, illustrated. Paper bound. **Price $.75**

The molding of concrete monuments to imitate the most expensive cut stone is explained in this treatise, with working drawings of easily built molds. Cutting inscriptions and designs is also fully treated.

***MOLDS FOR CAST STONE AND CONCRETE.** By F. Burren and G. R. Gregory. Heavy board cover, 79 pages, 11 by 7½ in.; 44 full page illustrations. **Price $1.25**

Detailed working drawings for the practical mold maker, covering a wide range of concrete and cast stone products. Drawings supply the necessary information, and brief descriptions are given in each case.

A lot of good information, not only for cast stone manufacturers, but for makers of special products made of ordinary concrete, such as fence posts, chimney caps and pots, well linings, laundry tubs, etc.

***GENERAL ENGINEERING HANDBOOK.** By Charles Edward O'Rourke and 29 associates. Flexible cover; 921 pages, 5 by 8 in., numerous tables, diagrams and illustrations. **Price $4.00**

This book assembles a great amount of fundamental engineering data in usable form. 31 separate sections deal with as many specific branches of engineering.

Of particular interest to engineers who specialize in the use of concrete as a structural material are sections devoted to "Highway," by Thomas R. Agg; "Reinforced Concrete Structures," and "Stresses in Framed Structures," by Charles Edward O'Rourke; "Engineering Materials," by Herbert H. Scofield; "Foundations," by Roland P. Davis; and "Mechanics," by Alfred P. Poorman.

REINFORCED CONCRETE CONSTRUCTION. By George A. Hool, Professor of Structural Engineering, University of Wisconsin. University of Wisconsin Extension Series.

Vol. I—Fundamental Principles. Third Edition. 380 pages, 6x9, 139 illustrations, 18 tables, 28 diagrams **$3.50**

Vol. II—Retaining Walls and Buildings. Second Edition. 700 pages, 6x9, illustrated........ **$6.00**

Vol. III—Bridges and Culverts. 688 pages, 6x9, over 600 illustrations, 41 plates........ **$6.00**

***CONCRETE ENGINEERS MANUAL.** By Samuel Baker and A. DeGroot. Cloth, 401 pages, 5 by 7½ in., numerous drawings, charts and tables. **Price $3.00**

This volume is intended as a textbook for students of concrete engineering, and as a reference book for designers, foremen, inspectors, and others involved in the design of concrete structures and in the making and placing of concrete.

The book contains a complete description of the modern methods of proportioning concrete mixtures, mixing and placing concrete and steel, and providing waterproofing. Mathematical tables and the fundamental principles of mathematics and mechanics of materials, as applied to reinforced concrete designs, are included.

Among other subjects treated in individual chapters are form work, foundations, design of retaining walls, and estimating concrete work.

CEMENT CHEMISTRY IN THEORY AND PRACTICE. By Prof. Dr. Hans Kuhl, Director of the Institute for Cement Research, Berlin. Translated into English by J. W. Christelow, B.Sc. 64 pages, 6 by 9, cloth cover. Illustrated with a number of halftones and diagrams. **Price $2.50**

An authoritative book on the chemistry of cement, a translation of a series of lectures delivered by Dr. Kuhl in Moscow, at the special request of the Soviet government. The author presents the most up-to-date knowledge of the subject in simple language. The translator is one who knows his subject very thoroughly. The result is a concise record of modern research on the manufacture and setting of cement.

CONTENTS

1. The development of Cement Research.
2. The Theory of Cement Burning.
3. The Constitution of Portland Cement Clinker.
4. The Problem of Hardening and Its Significance in Cement Research.
5. The Chemistry of High-Strength Cements.
6. The Technical Aspect of High-Strength Cements.

PRE-CAST CONCRETE FACTORY OPERATION. By H. L. Childe, Editor, "Concrete Building and Concrete Products" (England). 190 pages, 5½x9, illustrations and layouts. **Price $2.00**

Complete descriptions of the plant layouts, equipment, methods, and processes of 20 English manufacturers, large and small. Includes the whole range of pre-cast units from the largest cast stone and roofing tile and plain block plants to the small producers of miscellaneous products.

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To Regular Subscribers:

$1.50 (or $2.00 for Cement Mill Edition) added to the price of any of the above listed books will extend your present subscription one year from its present expiration date. Foreign and Canadian subscribers please write for details.

*Newly listed.

Book Department of CONCRETE, 400 West Madison Street, Chicago, Ill.

New Books and Pamphlets

Data on Sand and Gravel Aggregates

A RECENT list of bulletins issued by the National Sand and Gravel Association discloses a number of publications dealing with the relation of these materials to the making of concrete. The following are of particular interest in this connection:

Bulletin 2—Relation of Aggregates to Concrete.

Bulletin 4—Tables of Quantities of Materials for Concrete.

Bulletin 5—Effect of Characteristics of Coarse Aggregate on the Quality of Concrete.

Circular 4—Design and Control of Concrete Paving Mixtures.

Circular 6—Effect of Soft Particles of Coarse Aggregate on Strength and Durability of Concrete.

Circular 7—Effect of Addition of Finer Sizes to Gravel on the Strength of Concrete.

Circular 8—Effect of Grading of Gravel and Sand on Voids and Weights.

Circular 9—Utilization of Finer Sizes of Gravel in Concrete Highway Construction.

Circular 10—Deleterious Substances in Concrete Aggregates.

Data Sheet No. 1—Summary of State Highway Specifications for Sand and Concrete Pavement Construction.

Data Sheet No. 2—Summary of State Highway Specifications for Gravel for Concrete Pavement Construction.

Data Sheet No. 4—Tables of Quantities of Materials for Concrete.

Data Sheet No. 5—Specification for Fine Aggregate for Concrete.

Data Sheet No. 6—Specification for Coarse Aggregate for Concrete.

Copies of these publications may be obtained on request from the National Sand and Gravel Association, Munsey Building, Washington, D. C.

Directory of Contractors

DIRECTORY OF CONTRACTORS, Fifth Edition. Published by the Bureau of Contract Information, Inc., 729 Fifteenth Street, N. W., Washington, D. C. Paper cover, 150 pages, 6 by 9 in. Price $2.00.

This directory contains the names and addresses of about 5,000 contracting firms or individual contractors who have voluntarily or upon request filed their performance records with the Bureau of Contract Information. Information on specific contracting concerns is made available to architects, engineers, public works officials, and others who are responsible for the award of public and private contracts, and also to surety companies and to concerns who extend credit to the construction industry.

Sand and Gravel Deposits

DEVELOPMENT OF SAND AND GRAVEL DEPOSITS is the title of a 50-page mimeograph by J. R. Thoenen, published as Information Circular No. 6689 by the U. S. Bureau of Mines, in March, 1933. Several full-page illustrations appear as inserts.

ORGANIZATIONS

American Association of State Highway Officials; W. C. Markham, Executive Secretary, 1222-24 National Press Building, Washington, D. C.

American Concrete Institute; Harvey Whipple, Secretary, 641 New Center Building, Detroit, Mich.

American Concrete Pipe Association; M. W. Loving, Secretary 33 West Grand Ave., Chicago. Twenty-sixth annual convention, June 26-27. Edgewater Beach Hotel, Chicago, Ill.

American Road Builders' Association; Chas. Upham, Engineer-Director, National Press Building, Washington, D. C.

American Society of Civil Engineers; Geo. T. Seabury, Secretary, 33 West Thirty-ninth St., New York City. Annual convention, June 27-30, Chicago, Ill.

American Society for Testing Materials; C. L. Warwick, Secretary-Treasurer, 1315 Spruce St., Philadelphia, Pa. Annual meeting, June 26-30, Stevens Hotel, Chicago, Ill.

Associated General Contractors of America; E. J. Harding, Managing Director, 222 Munsey Bldg., Washington, D. C.

Building Officials Conference of America; Col. John W. Oehmann, Secretary, 1253 Lawrence St., N. E., Washington, D. C.

Cast Stone Institute; L. A. Falco, Secretary, Chapel St. and Blatchley Ave., New Haven, Conn.

Cement Institute; H. C. Lundborg, General Manager, 11 East 44th St., New York City.

Concrete Masonry Association; Jack Franklin, Secretary, 7071 Plankinton Bldg., Milwaukee, Wis.

Concrete Reinforcing Steel Institute; R. W. Johnson, Secretary, 333 North Michigan Ave., Chicago, Ill.

Engineering Institute of Canada; 2050 Mansfield St., Montreal, Quebec.

Highway Research Board; Roy W. Crum, Director, 2101 Constitution Ave., Washington, D. C.

Joint Committee on Standard Specifications for Concrete and Reinforced Concrete; F. R. McMillan, Secretary, 33 West Grand Ave., Chicago.

National Board of Fire Underwriters; W. E. Mallalieu, General Manager, 85 John St., New York City.

National Concrete Burial Vault Association; J. H. Stuart, Secretary-Treasurer, Bremen, Ohio.

National Crushed Stone Association; J. R. Boyd, Secretary, 1735 14th Street, N. W., Washington, D. C.

National Engineering Inspection Association; B. H. Witherspoon, Secretary, P. O. Box 1115, Pittsburgh, Pa.

National Fire Protection Association; Franklin H. Wentworth, Secretary, 40 Central St., Boston, Mass.

National Lime Association; Norman G. Hough, Secretary and Manager, 927 Fifteenth St., N. W., Washington, D. C.

National Ready-Mixed Concrete Association; V. P. Ahearn, Secretary, 545 Munsey Bldg., Washington, D. C.

National Sand and Gravel Association; V. P. Ahearn, Executive Secretary, 545 Munsey Bldg., Washington, D. C.

National Slag Association; H. J. Love, Secretary-Treasurer, 1449 Leader Bldg., Cleveland, Ohio.

National Terrazzo and Mosaic Association; U. F. Durner, Secretary, 815 West St. Paul Ave., Milwaukee, Wis. Annual meeting, June 19-22, Palmer House, Chicago, Ill.

Northwest Concrete Products Association; W. P. Hews, Secretary-Treasurer, Yakima, Wash.

Portland Cement Association; Edward J. Mehren, President; William M. Kinney, General Manager, 33 West Grand Ave., Chicago.

Rail Steel Bar Association; H. P. Bigler, Engineering Secretary; Builders' Bldg., 228 N. La Salle St., Chicago, Ill.

Wire Reinforcement Institute; R. D. Bradbury, Director, National Press Bldg., Washington, D. C.

Wisconsin Concrete Products Association; Jack Franklin, Secretary-Treasurer, 425 East Water St., Milwaukee, Wis.

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1000 Comfortable Rooms

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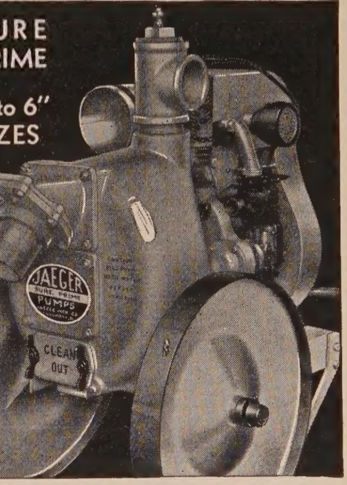

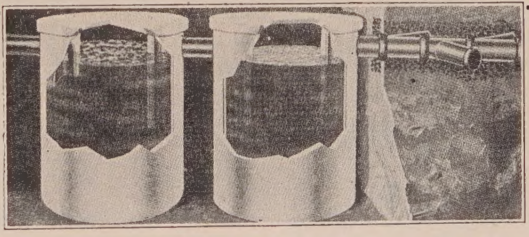

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One or more counties—assigned to you with all rights. No royalties; no strings, all profit yours. Worth real money to right man. Send now for FREE book that tells how to make money. **Write a postcard**

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NOTES AND NEW CATALOGS

Industrial Literature

Air Compressors

Single-stage, water-cooled rotary air compressors are the subject of *Leaflet* 2159 published by the *Allis-Chalmers Mfg. Co.*, Milwaukee, Wis.

This covers a complete line of up-to-date rotary air compressors and vacuum pumps of the multi-cellular, sliding-vane type, having a range of volumes from 50 to 2,000 c.f.m., at pressures up to 150 lb. and vacuums up to 29.85 in. mercury.

●

Jaeger Equipment

A booklet of unusual dimensions, on truck mixers, agitators, transfer loaders, and concrete spreaders, has been published by the *Jaeger Machine Co.*, Dublin, Ohio.

Measuring 11 by 17 inches, the publication makes possible good display of units and parts. Specifications and plant layouts are included.

●

Aggregate, Cement Handling Units

Heltzel steel portable bins for handling and batching concrete aggregates, portable steel trailer bins, and cement weighing batchers are covered in considerable detail in a 4-page folder issued by the *Heltzel Steel Form & Iron Co.*, Warren, Ohio.

●

Dowflake Curing

A folder issued recently by the *Dow Chemical Co.*, Midland, Mich., tells of "Two ways to be sure of high early strength with safe, automatic, inexpensive curing."

The text covers in brief the use of Dowflake in and on pavements.

●

Joint Installing Machines

The Flexible Road Joint Machine Co., Warren, Ohio, describes its transverse road joint installing machines in a 4-page folder containing lettered illustrations.

●

Automotive Road Pump

Enough water and fast enough for any 27-E paver, plus sprinkling, plus curing, is that which is achieved by the *Chain Belt Co.* in their Rex road pump. The Rex road pump will deliver 80 gal. at 500 lb. pressure or 125 gal. at 320 lb. pressure, and can be changed from one to the other in the field. Tests show that the pump can handle successfully 1,150 ft. elevation or 12 miles across country.

These and other features are covered in a folder, *Bulletin* 228.

●

Curing Concrete

Curing Modern Concrete Roads is the title of a 20-page bulletin recently issued by the *Philadelphia Quartz Co.*, Philadelphia, Pa. It covers the development of curing with silicate of soda from the road laid in Dallas County, Texas, in 1918 to present-day construction in all parts of the country.

In addition the advantages and cost of silicate curing, and the instructions for application are reviewed. The bulletin is attractively illustrated with many photographs.

●

Joist Construction Economy

Economy in total building cost effected by concrete joist construction is the factor stressed in the newest of 4-page folders issued by the *Concrete Reinforcing Steel Institute*, Chicago.

Manufacturers' News

Chain Belt Distributors

The newly organized *Blaisdell-Folz Equipment Co.*, at Cincinnati, Ohio, have been selected by the *Chain Belt Co.*, Milwaukee, as distributors of its complete line of Rex construction equipment.

The Chain Belt Co., Milwaukee, have appointed the *Ray Corson-Elkins Company* of Denver, to handle their complete line of Rex construction equipment in the entire state of Colorado and several counties in Wyoming.

●

Pipe Vibration

Patent on a vibrating attachment for cylindrical pipe forms has been granted to *Alfred W. Schultz*, general manager of the *Zeidler Concrete Products Machinery Co.*, Waterloo, Iowa.

Four claims for new ideas were allowed on the mechanism, which has a vibration rate of 4,000 times per minute.

EQUIPMENT and MATERIALS

A Four-Purpose Waterproofing Is Announced

The discovery of a new method of processing stearic acid which eliminates the ammonium and other metallic salts heretofore necessary to make it mix readily with the concrete was perfected by Master Builders' laboratories in 1932. This development made it possible to combine with pure stearate the puzzolanic ingredient, Omicron, which is said to add plasticity to mortars, increasing their workability even with reduced water ratio. This is of particular importance in mortar, in certain types of mass concrete where corrosive conditions are present, in stucco, and in the manufacture of concrete products including concrete vaults, cast stone, etc.

In liquid form, Omicron "4-in-1" waterproofing is added to the mortar in the proportions of one quart per sack of cement. The Omicron is highly reactive with the free lime released when the cement hydrates, converting it into an insoluble, cementitious material which adds strength and resistance to corrosion. This action checks the formation of efflorescence through conversion of the salts from which efflorescence originates.

The extraordinary plasticizing effect obtained is due to the gelatinous properties of the product which contributes notable lubrication while increasing the adhesive quality of the mortar.

●

Hard-Wearing Monolithic Floor Placed in One Operation

Maximent — "the concrete floor that comes in a sack"—produces plain or colored monolithic floors that are said to be tough and glass-hard. It is applied with one continuous operation for slab and surfacing. No mixing on the job or cleaning and chipping of the slab are required, according to the Maximent Co., Cincinnati, Ohio.

So little material is required that the cost, plus the freight, is saved in labor, it is stated.

A descriptive folder which includes specification is available.